SUBJECT: Guidelines for Conducting Close-out Surveys of Open Lands and Requesting Release for Unrestricted Use

I. Introduction

This document may be used as a guide for selecting sampling methods, performing surveys, and documenting the decontamination of open lands which have been restricted or potentially contaminated due to the use of radioactive material. Guidelines are also given for data which should be provided to the Executive Director when the licensee requests release of open lands for unrestricted use. This guide applies primarily to the release of lands which have been involved with in situ uranium recovery operations.

Before beginning surveying and sampling of the open lands to be released, the licensee should submit a surveying and sampling plan to the Executive Director, based upon the guidelines in this document.

II. Standards

The Texas Natural Resource Conservation Commission (TNRCC) adopted soil limits for radium-226 or radium-228 in 30 Texas Administrative Code (TAC) Section 336.6(f)(3) as follows:

(1) 5 picocuries per gram (pCi/g) above background in the first 15-centimeter (cm) layer of soil averaged over a l00 square-meter (m^2) area, and

(2) l5 pCi/g above background averaged over a l00-m^2 area in any l5-cm layer thereafter.

The TNRCC adopted soil contamination limits for other radionuclides in 30 TAC Section 336.6(f)(1)(A) and (B). Averaging over a soil volume of l00 m^2 by l5-cm depth is considered adequate for radium-226. Therefore, it is practicable to use the same averaging technique for natural uranium concentrations. The l00 m^2 by l5-

cm depth sampling method may be used for soils contaminated with natural uranium and the associated daughter products resulting from uranium recovery operations. For all other radionuclides, averaging should be over a soil volume of 1 m^2 by l5-cm depth. Surveys must be conducted in accordance with 30 TAC Section 336.1(4), which adopts by reference Section 21.501 of the Texas Regulations for Control of Radiation (TRCR) of the Texas Department of Health. The licensee should realize that the standards used are decontamination limits. The licensee should adhere to the concept of "As Low As Is Reasonably Achievable" (ALARA).

III. Instrumentation

The licensee should determine which type of instrumentation is most sensitive to the types and energies of radiation to be detected. When performing close-out surveys, the Executive Director uses 1-inch by 1-inch sodium iodide probes in conjunction with an appropriate ratemeter for surveying open lands which have been involved in uranium recovery operations. However, the licensee may choose other appropriate instrumentation, such as microroentgen meters. The instrument used should be appropriately calibrated and a daily efficiency check should be performed to assure the instrument is working properly. The licensee should also consider the distance at which the instrument is able to detect a significantly elevated area (hot spot) and the appropriate height above the ground at which the probe should be held. A hot spot is considered to be an area with a reading equal to or greater than twice background or an area with a radionuclide concentration sufficiently high such that the average for the l00-m^2 area will exceed the soil contamination limits.

IV. Survey and Sampling Procedures

A. Preliminary Survey Design

The licensee's preliminary survey area should be delineated with optimum grid spacing for the size of area to be released. In no case should any grid spacing be greater than l0 m. Each grid line should be surveyed along the entire length of the line. Readings should be recorded at no more than 10-m intervals. Although instrument readings may be documented every few meters, the response of the instrument should be monitored continuously while surveying along the grid lines.

Background radiation levels should be established by surveying areas adjacent to the survey area which are not affected by facility operations. The background level established by the licensee is

subject to approval by the Executive Director. If readings taken in the survey area cannot be distinguished from the established background level, those readings should be recorded as being the same as background.

The licensee's survey should be on a grid spacing small enough to assure the Executive Director that a hot spot has not been missed. Hot spots should be physically marked and recorded.

If the licensee decides to leave a hot spot(s), the area of contamination should be documented and an explanation submitted to the Executive Director justifying why the licensee has decided not to decontaminate the area.

If no hot spots are encountered during the preliminary survey, the licensee may use the preliminary survey as its final survey. If the preliminary survey is to be used as the final survey, random samples should be collected from the survey area, with a minimum of three samples per acre. Any hot spots found during the preliminary survey may be decontaminated after the preliminary survey. Also, a final survey need only document the decontamination of those areas found to be contaminated in the preliminary survey. The licensee should verify that soil contamination does not exceed the limits specified in 30 TAC Section 336.6(f).

B. Sampling Procedures

The licensee's sampling program should be comprehensive, covering the entire area to be released. If the licensee chooses not to decontaminate, the following areas should be sampled:

(1) Any area with survey readings which are greater than twice background; and

(2) Any area which has an average reading of one and one-half times the background reading and encompasses an area of 50 m^2 or greater.

The remaining discussion of the sampling procedures will be directly related to uranium recovery operations. However, other licensees may use similar procedures over the sampling area of concern.

When an area is sampled, the samples collected should be representative of the entire area. If the contaminated area covers 50 percent of the l00-m^2 area, then 50 percent of the samples collected should be from the contaminated area.

The licensee may average the concentrations of radium-226 and natural uranium over the first l5 cm of soil below the surface in a l00-m^2 area. In soil more than l5 cm below the surface, the concentrations may be averaged in l5-cm layers in a l00-m^2 area. The licensee should, at a minimum, sample the initial l5-cm layer (0-15 cm) and the second l5-cm layer (15-30 cm) if concentrations in the initial 15-cm layer indicate deeper sampling is necessary. A minimum of five samples from each layer should be collected within the l00-m^2 area.

When a contaminated area which is less than l00 m^2 is sampled, the hot spot must be sampled as part of a single l00-m^2 area. The contaminated area may not be split into two sections which are located in two separate l00-m^2 areas. Figure 1 depicts an acceptable method of sampling such a hot spot, and Figure 2 depicts an unacceptable method.

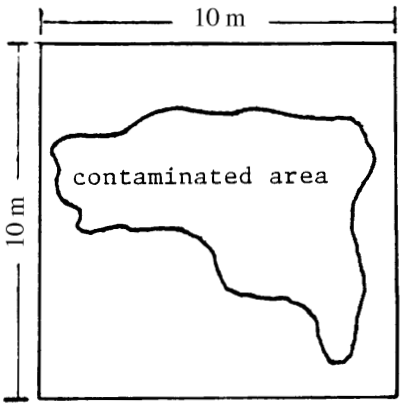


Figure 1

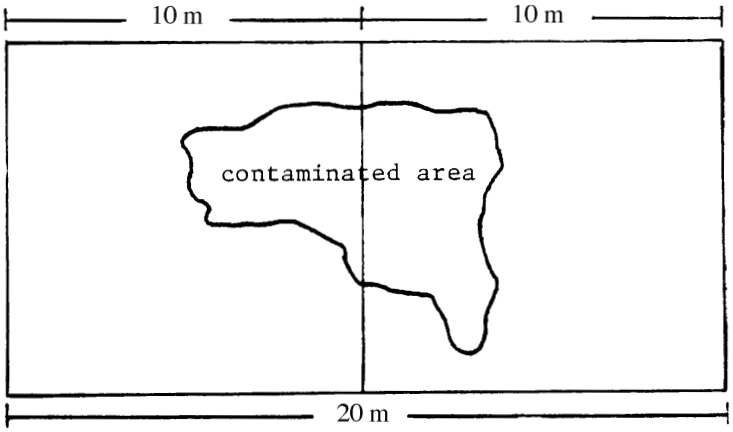
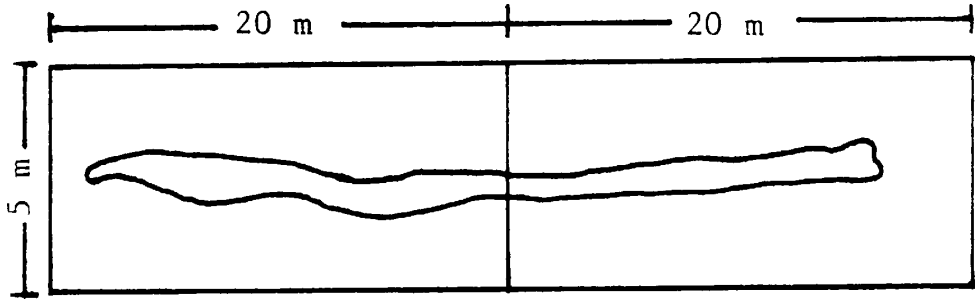


Figure 2

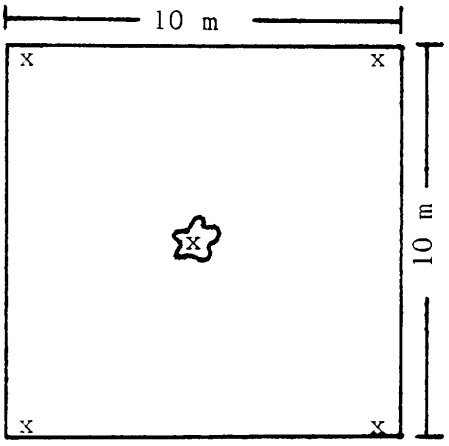
However, if the contamination occurs in narrow strips, 1 m wide or less, the Executive Director may allow the licensee to divide the contaminated area into more than one sampling area as depicted in Figure 3. The dimensions of the sampling area should not be narrower than 5 m on any boundary.

Figure 3



If a small hot spot is encountered (less than 1 m in diameter), then that hot spot should be placed in the center of the l00-m^2 sampling area. One sample should be collected from the hot spot and four additional samples collected by sampling 1 m toward the center from each corner of the 100-m^2 area. Again, the initial l5-cm layer (0-15 cm) should be sampled, and the second l5-cm layer (15-30 cm) should be sampled if necessary. This sampling technique is depicted in Figure 4.

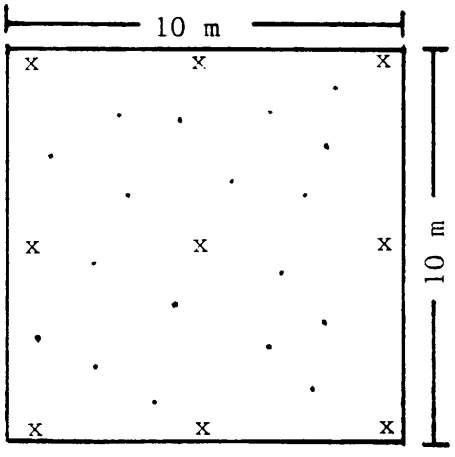
Figure 4



x denotes sample location

If numerous small hot spots occur in close proximity to one another, they should be sampled as one l00-m^2 area, and a more widely distributed array of samples should be collected from such an area. Figure 5 is an example of an acceptable method.

Figure 5



x denotes sample locations

denotes hot spots

Figure 5 indicates nine samples collected from the l00-m^2 area. The licensee may choose fewer or additional sampling locations within the l00-m^2 sampling area.

All areas which are sampled should be accurately identified on a scaled map. The samples should then be submitted to a qualified laboratory for analyses. The Executive Director recommends that each sample be analyzed separately. After the analyses of the samples are completed, the results can be averaged with results of other samples collected from the same sampling area and the same depth. The separate analysis of each sample allows a more precise determination as to the highest concentrations that will be released.

V. Request For Confirmation Survey and Sampling by the Executive Director

When the licensee is confident that the area of concern will be acceptable for release for unrestricted use, a written request asking for release for unrestricted use must be submitted to the Executive Director. The information discussed in this guide should be submitted in a comprehensive report, accompanied by survey and sample results which show that contamination is less than the limits specified in 30 TAC Section 336.6(f).

If the area to be released has been involved in uranium mining or milling, the Executive Director will perform a survey before a release can be authorized. If the area involves a well field or part of a well field, the Executive Director will also perform a survey before a release will be authorized. In all cases, the well field or portion thereof must be considered restored by the TNRCC, and the TNRCC in situ mining permit requirements must be satisfied before the Executive Director will consider releasing the surface for unrestricted use.

The licensee should submit as much information as possible to aid the Executive Director in performing an efficient confirmatory survey and sampling program. Submitting pre-operational data will help the Executive Director determine the background for the area. If pre-operational data are not available, background radiation levels should be established as indicated in Section IV(A) of this document.

Operational data, such as maps of non-routine contamination, including spills and pipe leaks, will aid the Executive Director in determining areas that might need closer attention. Documentation of cleanup activities during operation and sample results before and after cleanup should be submitted to the Executive Director.

Documentation of the survey results should be submitted to the Executive Director in the form of a scaled survey map which provides coordinates of the area surveyed. The map should also identify all structures in that area.

In order for an area to be released, soil contamination must not exceed the limits specified in 30 TAC Section 336.6(f). The license's release request should include surveys and sample results demonstrating that these limits have been met.

Because of limitations in the Executive Director's staff and time, each licensee should prepare for the release of its equipment or facilities far enough in advance to provide sufficient time for appropriate surveys and sample analyses to be performed. The licensee should be aware that a TNRCC inspector may terminate a close-out survey should a discrepancy exist between the inspectors's survey and the information submitted by the licensee. Such discrepancies may include the inspector's encountering higher survey readings than reported by the licensee, or misrepresentation of areas of contamination. Terminating a close-out survey could cause delays in acquiring approval for release of the area. The licensee will be required to submit information to the Executive Director to explain the discrepancies, the actions taken to correct them, and the results of a complete follow-up survey. The Executive Director would then reschedule the close-out survey.

VI. For More Information

This guidance is issued to assist TNRCC licensees and applicants in implementing and complying with specific parts of the radiation rules (30 TAC Chapter 336). Methods other than those presented in this guide may be proposed by the licensee or applicant for approval. For assistance with any questions, please contact the UIC, Uranium, and Radioactive Waste Section, MC-131, Texas Natural Resource Conservation Commission, P.O. Box 13087, Austin, Texas 78711-3087, telephone number (512) 239-6065.

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